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Application No. 09/084,263

✓ Page 10,

- ✓ line 18, change "fibres" to --fibers--.
- ✓ line 2, change "show" to --shown--;
- ✓ line 26, change "fibres" to --fibers--;
- ✓ line 27, change "fibres" to --fibers--;
- ✓ line 28, change "fibres" to --fibers--;
- ✓ line 31, change "fibres" (both occurrences) to --fibers--;
- ✓ line 32, change "fibres" to --fibers--;
- ✓ line 33, change "fibres" to --fibers--.

✓ Page 11,

- line 1, change "fibres" to --fibers--;
- line 4, change "fibres" to --fibers--.

✓ Page 12,

- ✓ line 1, change "fibres" to --fibers--;
- ✓ line 7, change "fibre" to --fiber--;
- ✓ line 8, change "fibres" (both occurrences) to --fibers--;
- ✓ line 9, change "fibres" to --fibers--;
- ✓ line 11, change "fibres" to --fibers--;
- ✓ line 14, change "fibres" to --fibers--;
- ✓ line 15, change "fibres" to --fibers--;
- ✓ line 20, change "fibres" to --fibers--;
- ✓ line 21, change "fibres" to --fibers--;
- ✓ line 22, change "fibres" to --fibers--;
- line 29, change "fibre" to --fiber--.

IN THE CLAIMS:

✓ Please cancel claim 10 without prejudice to or disclaimer of the subject matter therein.

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Please amend claims 1-11, 13-16 and 18-20 as follows:

1. (Amended) A [fibre] fiber reinforced metal rotor comprising a hub, a rim and a member extending radially between and interconnecting the hub and the rim, the [fibre] fiber reinforced metal rotor having an axis of rotation,

the [fibre] fiber reinforced metal rotor having at least two rings of [fibres] fibers arranged integrally within the [fibre] fiber reinforced metal rotor,

a first ring of [fibres] fibers being arranged substantially at a first radial distance from the axis of rotation, a second ring of [fibres] fibers being arranged substantially at a second radial distance from the axis of rotation and the second radial distance is greater than the first radial distance,

the first ring of [fibres] fibers being arranged in the hub of the [fibre] fiber reinforced metal rotor.

Claim 2, line 1, change "fibre" to --fiber--;

line 2, change "fibres" to --fibers--;

line 3, change "fibre" to --fiber--.

3. (Amended) A [fibre] fiber reinforced metal rotor as claimed in claim 1 wherein the [fibre] fiber reinforced metal rotor comprises a metal selected from the group [comprising] consisting of titanium, titanium aluminide, an alloy of titanium, [or any suitable] a bondable metal, a bondable alloy and a bondable intermetallic [which is capable of being bonded].

4. (Amended) A [fibre] fiber reinforced metal rotor as claimed in claim 1 wherein each of the rings of [fibres] fibers comprises a [fibre] fiber selected from the group [comprising] consisting of silicon carbide, silicon nitride, boron, and alumina [and other suitable fibres].

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- ✓ Claim 5, ✓ line 1, change "fibre" to --fiber--;
line 2, change "fibre" to --fiber--.
- ✓ Claim 6, ✓ line 1, change "fibre" to --fiber--;
line 3, change "fibre" to --fiber--.
- ✓ Claim 7, ✓ line 1, change "fibre" to --fiber--;
line 3, change "fibre" to --fiber--.
- ✓ Claim 8, ✓ line 1, change "fibre" to --fiber--;
line 2, change "fibre" to --fiber--;
line 3, change "metres" to --meters--.

9. (Amended) A [fibre] fiber reinforced metal rotor as claimed in claim 1 comprising [a plurality of axially spaced rotor discs] an upstream rotor disc and a downstream rotor disc, at least one of the rotor discs having at least two rings of [fibres] fibers, each rotor disc having a plurality of rotor blades extending radially therefrom, a [stator] casing spaced from the rotor by a clearance, at least one annular spacer extending axially between and secured to [an] the upstream rotor disc and [a] the downstream rotor disc, the at least one annular spacer being [fibre] fiber reinforced to limit the radial movement thereof and hence the clearance between the rotor and the [stator] casing.

- ✓ Claim 11, ✓ line 1, change "stator" to --casing--;
line 3, change ", the at least" to ---;
delete lines 4-6 in their entirety.
- ✓ Claim 13, line 2, change "fibre" to --fiber--.
- ✓ Claim 14, line 2, change "fibre" (both occurrences) to --fiber--;
line 4, change "fibres" to --fibers--.

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15. (Amended) A rotor as claimed in claim 13 wherein the [fibre] fiber reinforced metal spacer comprises a metal selected from the group [comprising] consisting of titanium, titanium aluminide, an alloy of titanium, [and any suitable] a bondable metal, a bondable alloy [or] and a bondable intermetallic [which is capable of being bonded].

✓ Claim 16, line 2, change "fibres" to --fibers--; change "fibre" to --fiber--; change "comprising" to --consisting of--;

✓ line 3, after "boron," insert --and--; delete "and other";

✓ line 4, delete "suitable fibres".

✓ Claim 18, line 1, change "fibre" to --fiber--;

✓ line 3, change "minimise" to --minimize--.

✓ Claim 19, line 1, change "fibre" to --fiber--.

✓ Claim 20, line 1, change "fibre" to --fiber--.

Please add new claim 23 as follows:

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--23. A fiber reinforced metal rotor as claimed in claim 1 wherein each of the first ring of fibers and the second ring of fibers comprises fibers extending circumferentially with respect to the axis of rotation.--

REMARKS

Claims 1-23 are pending herein. By the Office Action, the drawings and specification are objected to; claims 3-4 and 15-16 are rejected under 35 U.S.C. §112, first paragraph; claims 1-22 are rejected under 35 U.S.C. §112, second paragraph; claims 1-7 and 22 are rejected under 35 U.S.C. §102(b); and claim 8 is rejected under 35 U.S.C. §103(a). By this Amendment, the title, Abstract, specification and claims 1-11, 13-16 and 18-20 are amended, and claim 23 is added. No new matter is added.

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Applicant thanks the Examiner for the indication that claims 9-21 are objected to for being dependent upon a rejected base claim, but are otherwise allowable. However, for all of the reasons described below, all of claims 1-22 are believed to be in condition for allowance.

I. Objection to Drawings

Figures 1 and 2 are objected to because they should allegedly be labeled as "Prior Art." Attached hereto is a Request for Approval of Drawing Corrections, to label Figures 1 and 2 as "Prior Art." Reconsideration and withdrawal of the objection are respectfully requested.

II. Objection to Specification

The specification is objected to for asserted informalities. First, the specification is objected to for misspellings of various words. By this Amendment, the specification is amended to address this ground of objection.

The specification is also objected to for failing to properly identify the serial number and filing date of the provisional U.S. patent application. Applicant respectfully submits that this objection is an error, because the present application does not claim the benefit of an earlier filed U.S. provisional patent application. Accordingly, no identification of such a provisional application is necessary or proper.

Reconsideration and withdrawal of the objections are respectfully requested.

III. Rejections Under 35 U.S.C. §112

A. First Paragraph

Claims 3-4 and 15-16 are rejected under 35 U.S.C. §112, first paragraph, as allegedly not being fully enabled by the specification. In particular, the Office Action asserts that while the specification is enabling for specified metals and fibers, the specification does not provide enablement for any suitable metal, fibers, alloy and intermetallic capable of being bonded.

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Claims 4 and 16 are amended to overcome the rejection. Applicant respectfully traverses this rejection.

As amended, claims 3 and 15 specify that the metal is selected from the group consisting of titanium, titanium aluminide, an alloy of titanium, a bondable metal, a bondable alloy and a bondable intermetallic. This aspect of the claimed invention is described in the specification at, for example, page 12, lines 17-19. Applicant respectfully submits that one of ordinary skill in the art would be readily able to determine, without undue experimentation, what suitable metals, alloys and intermetallics could be used in the claimed invention. With respect to the bondable materials, Applicant respectfully submits that one of ordinary skill in the art would recognize that various materials are suitable for use according to the claimed invention, particularly in view of described diffusion bonding processes discussed in the specification at, for example, page 9, lines 4-23.

Under the law relating to 35 U.S.C. §112, the written description must communicate that which is needed to enable the skilled artisan to make and use the claimed invention. Kennecott Corp. v. Kyocera International Inc., 5 USPQ2d 1194, 1197 (Fed. Cir. 1987). An invention may be described in different ways and still be the same invention. Id. The test for determining compliance with the written description requirement is whether the disclosure of the application as originally filed reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter, rather than the presence or absence of literal support in the specification for the claim language. In re Kaslow, 217 U.S.P.Q. 1089, 1096 (Fed. Cir. 1983). The test for enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation. United States v. Teletronics, Inc., 8 USPQ2d 1217, 1223 (Fed. Cir. 1988). A patent need not

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teach, and preferably omits, what is well known in the art. Spectra-Physics v. Coherent, 3 USPQ2d 1737, 1743 (Fed. Cir. 1987).

Because the specification clearly describes the necessary properties of the metal, i.e., its capability of being bonded to other components of the rotor, and because such properties are either well known to one of ordinary skill in the art or can be determined by only routine experimentation, the specification fully enables the scope of the present claims.

For at least these reasons, claims 3-4 and 15-16 satisfy the requirements of 35 U.S.C. §112, first paragraph. Reconsideration and withdrawal of the rejection are respectfully requested.

B. Second Paragraph

Claims 1-22 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicant respectfully traverses this rejection.

The claims have been variously amended to address the grounds of rejection.

For at least these reasons, claims 1-22 are not indefinite, and satisfy the requirements of 35 U.S.C. §112, second paragraph. Reconsideration and withdrawal of the rejection are respectfully requested.

IV. Rejections Under 35 U.S.C. §102(b)

A. Rossman

Claims 1-7 and 22 are rejected under 35 U.S.C. §102(b) over Rossman. The Office Action asserts that Rossman discloses all of the limitations of the claimed invention. Applicant respectfully traverses this rejection.

Independent claim 1 is directed to a fiber reinforced metal rotor comprising a hub, a rim and a member extending radially between and interconnecting the hub and the rim, the

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fiber reinforced metal rotor having an axis of rotation. See claim 1. Claim 1 further specifies that the fiber reinforced metal rotor has at least two rings of fibers arranged integrally within the fiber reinforced metal rotor. The first ring of fibers is arranged substantially at a first radial distance from the axis of rotation, and the second ring of fibers is arranged substantially at a second radial distance from the axis of rotation, with the second radial distance being greater than the first radial distance. Furthermore, claim 1 specifies that the first ring of fibers is arranged in the hub of the fiber reinforced metal rotor. Such a fiber reinforced metal rotor is not disclosed in Rossman.

In order to anticipate the claimed invention, the cited reference must teach each and every limitation of the claimed invention. However, Rossman does not teach at least the limitations of claim 1 that (1) the first ring of fibers is arranged in the hub of the fiber reinforced metal rotor and (2) that the fiber rings are located at different radial distances from the axis of rotation. Accordingly, Rossman cannot anticipate the claimed invention.

Rossman is directed to a rotor wheel, particularly for compressors, including a rotor disc and a plurality of radially-projecting metal blades arranged along the periphery of the disc. According to Rossman, the rotor wheel includes a plurality of locating rings, formed predominantly of directionalized fibers, each locating ring being adjacent to all of the blade roots and serving to resist centrifugal loads of the blades. An attachment ring is also formed predominantly of undirectionalized fibers, surrounding the periphery of the rotor disc. See Rossman at Abstract. Thus, for example with reference to the Figures of Rossman, the disclosed rotor wheel appears to include a ring of undirectionalized fibers, denoted ring 4 in the Figures, and a ring of directionalized fibers, denoted ring 5 in the Figures. However, both

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of the disclosed fiber rings are positioned in the rim of the rotor wheel, not in the hub as required in instant claim 1.

In fact, Rossman is completely silent as to including a ring of fibers in the rotor hub. With reference to the Figures of Rossman, the hub of the rotor wheel assembly is not even depicted in the Figures. Rather, Rossman discloses that the fiber rings 4 and 5 are located in the rim portion of the rotor assembly as attachment means for securing the rotor blades to the rotor assembly. Accordingly, Rossman fails to disclose the limitation of instant claim 1 that "the first ring of fibers being arranged in the hub of the fiber reinforced metal rotor."

Furthermore, Rossman does not disclose two rings of fibers that are located at different radial distances from the axis of rotation. In Rossman, both fiber rings 4 and 5 are arranged at about the same radial distance from the axis of rotation. Rossman thus does not disclose the limitation in claim 1 that "the second radial distance is greater than the first radial distance."

For at least these reasons, Rossman does not anticipate the claimed invention. Reconsideration and withdrawal of the rejection are respectfully requested.

B. Wagle

Claims 1-7 and 22 are rejected under 35 U.S.C. §102(b) over Wagle. The Office Action asserts that Wagle discloses all of the limitations of the claimed invention. Applicant respectfully traverses this rejection.

Like Rossman, described above, Wagle also appears to disclose the inclusion of rings of fibers in a rotor assembly. With reference to Figures 1 and 2, Wagle discloses rings of fibers, denoted 29 and 30. However, as with Rossman, the fiber rings in Wagle are disposed only at the rim portion of the rotor assembly, and at the a same radial distance from the axis of

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rotation. Wagle does not disclose that at least one of the fiber rings is disposed in the hub of the rotor assembly, or that the fiber rings are located at different radial distances from the axis of rotation. In fact, with reference to Figure 1 where the hub is specifically depicted, Wagle does not show a ring of fibers being located in the hub but instead shows the rings being located next to each other at a same radial distance from the axis of rotation.

Accordingly, Wagle does not disclose the limitation of instant claim 1 that "the first ring of fibers being arranged in the hub of the fiber reinforced metal rotor" and "the second radial distance is greater than the first radial distance." Wagle thus cannot anticipate the claimed invention.

For at least these reasons, claims 1-7 and 22 are not anticipated by Wagle.

Reconsideration and withdrawal of the rejection are respectfully requested.

V. Rejection Under 35 U.S.C. §103(a)

Claim 8 is rejected under 35 U.S.C. §103(a) over Rossman. Applicant respectfully traverses this rejection.

As described above, independent claim 1, from which claim 8 depends, specifically requires that the first ring of fibers is arranged in the hub of the fiber reinforced metal rotor. As described in the specification, at page 6, lines 16-19, the requirement that the first ring of fibers is located in the hub of the rotor assembly is important because the first fiber ring assists in carrying the load on the compressor rotor blades, while reducing the density of the hub and hence its weight. The first fiber ring, in combination with the claimed second fiber ring, provides the novel and non-obvious benefit of reducing the size, density and weight of the entire rotor assembly as compared to conventional solid metal rotor assemblies. See, specification at page 6, lines 9-22.

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In contrast, Rossman nowhere discloses, teaches or suggests locating a ring of fibers in at least the hub portion of the rotor assembly. Rather, as described in detail above, Rossman teaches locating a fiber ring only in the rim portion of the rotor assembly to assist in securing the blades to the rotor. Nowhere does Rossman teach or suggest that one of the fiber rings could or even should be removed from the rim portion of the rotor assembly and moved to the hub portion of the rotor assembly. Because Rossman teaches that both fiber rings are used to secure the blades to the rotor, there would be no apparent reason why one of ordinary skill in the art would remove one of the required fiber rings from the rim portion, and/or relocate a fiber ring in the hub area of the rotor assembly.

It has clearly been held that the reason, suggestion or motivation for combining or modifying the references "can not come from the applicant's invention itself." In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). That is, the motivation for modifying or combining the references can not be a product of hindsight reconstruction of the claimed invention based on applicant's own disclosure. Such a hindsight reconstruction has clearly been made in the present Office Action. The Office Action asserts that the claimed invention would have been obvious based on a hindsight selection of the claimed limitations, as evidenced by the absence of any teachings of the claimed invention in the reference. Such an allegation of obviousness is improper because the reference, viewed by itself and not in retrospect, must suggest the claimed invention. In re Shaffer, 229 F.2d 476, 108 USPQ 326 (C.C.P.A. 1956); In re Stoll, 523 F.2d 1392, 187 USPQ 481 (C.C.P.A. 1975). Here the reference does not provide any motivation for modifying the disclosed teachings to practice the claimed invention.

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Accordingly, one of ordinary skill in the art would not have been motivated by Rossman to form the claimed fiber reinforced metal rotor, wherein at least a first ring of fibers is arranged in the hub of the fiber reinforced metal rotor. Thus, at least independent claim 1 would not have been obvious to one of ordinary skill in the art over Rossman. Claim 8, which depends from claim 1, would not have been obvious over Rossman for at least the same reasons as claim 1. Reconsideration and withdrawal of the rejection are thus respectfully requested.

VI. Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully submits that the application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

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Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,



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JAO:JSA/amw

Attachments:

Request for Approval of Drawing Corrections
Abstract

Date: August 24, 2000

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